



At the California Highway Patrol testing facility in West Sacramento, bolts to secure a lighting pole are adjusted as part of a safety project to ensure that the pole separates from its base when struck by a moving vehicle. Caltrans initiates or supervises nearly 200 research tasks every year.

Science Drives Highway Solutions at Caltrans

Department's Active Research Division, Partnerships Increase Knowledge Base

In contrast to its higher-profile projects on the State Highway System, Caltrans also maintains an active research division that quietly works to improve road reliability, functionality, efficiency, sustainability and worker and traveler safety.

Each year, Caltrans initiates or supervises nearly 200 research tasks with the goal of increasing knowledge of critical transportation issues, and developing potential solutions to the Department's infrastructure, policy, equipment and safety needs.

For the 2017-18 fiscal year that ended June 30, 2018, Caltrans put a total of \$26.3 million into research efforts conducted internally and in partnership with the federal government and university-based programs. For the current FY 2018-19, the Department budgeted \$27.5 million toward its overall research program that is overseen by its Division of Research, Innovation and System Information (DRISI).

The research funds are directed into six categories of programs: Caltrans in-house "functional" research efforts, U.S. Department of Transportation University

Transportation Centers (UTC) research and University of California-partnered research centers, national cooperative research programs, deployment/implementation to ensure findings become policy and procedure, and roadside safety research that includes crash testing of roadside safety devices.

The combined research efforts cover a broad swath of transportation issues, from technical studies — "Improving the Foundation Layers for Concrete Pavements," or "Post Tensioned Box Girder Deck Replacement Method," to name two — to broader discussions on safety, planning or fast-arriving changes to the transportation landscape — such as "The Mobility of Millennials in California."

Caltrans puts an emphasis on sponsoring research to achieve tangible results. The Department's 2015-2020 Strategic Management Plan sets performance targets for three broad areas of research to evaluate if Caltrans stewardship and efficiency goals are being met: Caltrans functional research, research done with UTCs, and cooperative national research programs.

Progress in the strategic plan is based on the

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percentage of research projects that yield implementable solutions. For 2017-18, Caltrans' functional research projects showed a 67 percent implementable outcome rate; a 6 percent improvement from the previous fiscal year. Caltrans' strategic plan calls for reaching a 75 percent performance target by 2020.

Work done through UTCs generated potential solutions 28 percent of the time in 2017-18 (40 percent target by 2020). Caltrans' national cooperative research most recently showed a 52 percent implementable solutions rate, already beating the 2020 target of 20 percent. The interim strategic plan target has been met or exceeded in all three categories in each of the years it has been listed as a Caltrans performance measure.

One of the success stories has been the development of the Mountain Pass Road Opening (MPRO) system in cooperation with University of California, Davis, researchers. Caltrans is increasing its use of the system that allows snow removal equipment operators to visualize the exact location of the road and roadside obstructions covered by ice and snow, increasing safety during mountain pass clearings. (See story, pages 24-25.)

Improving internal operations prioritized

Caltrans devotes the largest part of its overall research budget to its functional research. More than half of the total 2017-18 research budget, \$12.5 million, went toward research focused on improving Caltrans internal operations. Here, DRISI project managers lead selected projects that examine key parts of the transportation system, such as highway construction, design, environment, geology-based engineering (geotech) and structures, maintenance, pavement, multimodal transportation, transportation safety and other services. Individual studies frequently take several years to complete.

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spent \$5.7 million in the last fiscal year to participate in national research programs and panels. As a testament to the powers of partnerships, the affiliation with the Transportation Research Board, an adjunct of the National Academy of Sciences in Washington, D.C., netted Caltrans an estimated \$32 worth of research-related activities for each dollar invested.

The Department also works extensively with universities that offer specialized technical expertise and state-of-the-art facilities, equipment and materials. Caltrans funded \$3.3 million in research activities in the last fiscal year at partnered research centers at UC Davis and UC Berkeley that do cutting-edge research in the fields of safety, seismic, intelligent transportation systems, alternative fuels and vehicles, and pavement.

Another \$2.1 million in task-based state matching funds went to three UTCs, led by San Jose State University, UC Davis and the University of Southern California. The centers provide Caltrans expertise in mass transportation, planning, rail and traffic operations. **MM**

Source: Caltrans Division of Research, Innovation and System Information

Allocation of Research Funds, 2018-19

